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The Motion in Some A Double Stars

SIXTH NOTE

The year 1920 was an unfavorable one, relatively speaking, for double star work at Mount Hamilton. This was chiefly due to the fact that the rainy season began very early in the autumn, giving us an unusually high percentage of cloudy nights in the months September to December. Nevertheless, measures of 243 more A pairs and ot a number of miscellaneous binaries were secured.

Since the A pairs were chiefly those with numbers above 2500, the difference of epoch since discovery was less than for the pairs remeasured in earlier years. But the percentage of pairs showing change in angle or distance, or both, is fully as great. Seventeen of these pairs are listed in the following table.

STAR	Δ EPOCH	Δθ	ρ DISC.	Δρ	MAGS.
A1581	12.9y	+46°.7	0".28	+0".03	9.7−9.7
A1729	11.8	+22 .0	0 .28	+0 .04	7.2−9.2
A1745	12.3	+39 .0	0 .37	−0 .15	9.5−10.0
A1755	12.0	+13 .4	1 .04	+0 .23	8.5−12.8
A1765	11.4	−34 .0	0 .16	−0 .01	8.6−8.6
A2069	10.4	−38 .3	0 .24	−0 .02	8.5−8.5
A2173	9.9	−16 .0	0 .25	+0 .07	9.6−9.7
A2475	7.8	−14 .2	0 .22	+0 .02	9.6−9.6
A2586	7.0	−16 .6	0 .36	+0 .02	9.2−9.7
A2592	6.8	−16 .3	0 .27	+0 .06	7.3−7.8
A2621	7.0	+15 .2	0 .20	−0 .01	8.3−8.3
A2639	7.0	−19 .0	0 .35	+0 .01	9.2−9.7
A2667	6.9	+16 .0	0 .37	+0 .02	6.7−7.2
A2695	6.8	−15 .0	0 .22	+0 .07	7.0−9.0
A2983	4.1	+72 .2	0 .19	−0 .03	9.1−9.1
A2992	4.1	−16 .2	0 .23	−0 .02	9.4−9.4
A2993	4.9	−13 .9	0 .25	±0 .00	9.3−9.4

It will be seen that, with the single exception of A1755, all of the pairs are very close ones, the angular separation falling below, and generally much below 0".4. The change in A1755 may be due to the proper motion of the bright star; it amounts to about 0".03 per year. The pair A1745 is the faint component (8.5 magnitude) of the wide triple system, OΣ 190 rej. Hussey, in 1898, found a 12th magnitude companion to the brightest star of the triple, but missed this close pair. The OΣ stars have shown no relative change since Dembowski's measures in 1867, and my measures of Hu 224 in 1907 and 1920 agree with those of Hussey in 1898.

The most rapid motion observed is that in the pair A2983. As the angular separation has not varied greatly, it is possible that this may prove to be a system of very short period.

An additional system of interest is *ρ Geminorum*—A2124. In 1910 I discovered a 12th magnitude companion to the bright star (4.18 magnitude) and my measures in 1913 and 1920 show that this shares the latter's proper motion, which, according to Boss is 0″.227 in 31°.0 annually.

My measures are:

1910.18	11°.4	2″.80	2n
1913.21	11 .6	2 .84	2
1920.21	9 .6	2 .96	2

If the two stars were independent, the companion, in 1920, should have been about 1″.2 from the bright star in 328°.

Another wide pair that is certainly a physical system is A53, which was mentioned in one of my earlier notes. With the set of measures recently secured the record stands:

1900.20	45°.6	4″.94	2n
1904.08	44 .8	4 .69	1
1915.81	43 .7	4 .20	2
1920.80	42 .1	3 .94	2

On the basis of the position in 1900 and the proper motion of the primary star (0″.72 in 78°.1 according to *Cinn. Publ.* 18), we should expect the last position to be approximately 11″ in 270° if the two stars were independent. The spectrum of the primary is K0 and its photometric magnitude is 8.6. The companion is about four magnitudes fainter.

In two of my preceding notes attention was called to the rapid relative motion of the components of A351. Additional measures were secured in the years 1919 and 1920 and the series now stands as follows:

1902.48	65°.4	0″.55	4n
1910.31	75 .8	0 .38	2
1916.58	220 .3	0 .19	1
1917.67	227 .2	0 .28	2
1919.45	234 .3	0 .35	2
1920.60	233 .4	0 .42	3

When these positions of the companion star are plotted it will be seen that they lie very nearly along a straight line; but it will also be found that the motion along this line is variable, being greatest when the angular distance from the primary is least. It can hardly be doubted that the system is a physical one, the orbit being highly inclined to the plane of projection, but no conclusion as to the length of the period or of the value of the other orbit elements is possible at this time.

Jan. 5, 1921. R. G. AITKEN.